NEGP MONTHLY

A monthly in-depth look at states and communities and their efforts to reach the National Education Goals
Published by the NATIONAL EDUCATION GOALS PANEL

In This Issue:

States Highlighted in this Issue:

Tennessee
Alaska
Vermont

"Men, Machines and Modern Times"

In *Men, Machines and Modern Times,* Elting Elmore Morison wrote in 1966 that "the computer is not better than its program." Morison might be dazzled at the rapid growth of computer technology, particularly how it is spreading as a teaching tool in American schools. Yet, his comment echoes among the four pillars of technology developed by the Department of Education's Office of Educational Technology: accessibility of computers to students; networking of computers; development of software that is relevant to curriculum; and teachers prepared to use technology.

This Monthly explores the advent of computers in the classrooms in three states: Tennessee, Alaska and Vermont. It also touches on the future plans of "men and machines."

Overview

At the dawn of the 20th century, few would have predicted that by the year 2000 children in Iowa studying the works of Leonardo da Vinci could take a virtual tour of the Louvre in Paris and have direct access to his Mona Lisa on a computer situated in their classroom. Who at that time would have thought that a child struggling to make sense of the written language could visit the school's reading specialist and work on a computer program to help solve the mystery of reading? Or, could engage in computer simulations to construct a state-of-the-art robot and then study the mathematics involved in its construction?

Computers have the potential of becoming the chalkboards of the future in many classrooms nationwide. Children are expected to become computer literate in order to prosper in the 21st century work world that is increasingly dependent on technology. More schools are wired, or are being wired, to one another and to the outside world through access to the Internet. Much of the focus on technology education has shifted from

hardware to finding appropriate software that compliments the curriculum and provides professional development opportunities to teachers.

The march to build bridges from schools to the digital world continues full-speed ahead. Math instruction and technology go hand-in-hand, according to Glenda Lappan, president of the National Council of Teachers of Mathematics, because computers "allow students and teachers to explore areas of math that are not accessible with paper and pencil." For example, Lappan explained that "geometry packages allow students to conjecture, view the geometric conjectures on a computer, which leads back to the math." Lappan, who also is a professor at Michigan State University, underscored the importance of connecting 8th-grade students with math. "Eighth grade is the most important math transition," she said. "Eighth graders sit on the boundary of a world of kids and the world of university students," she added. For her, the computer is a modern vehicle that can help young students cross the border into more advanced mathematics.

As part of Goal 5 of the National Education Goals— Mathematics and Science Achievement — the National Education Goals Panel monitors mathematics resources. The Goals Panel reports on access to computers in math classrooms. Specifically, the Goals Panel asks: "Have states increased the percentage of public school 8th graders whose mathematics teachers report that they have computers available in their mathematics classrooms?"

Equity issues led the Goals Panel's Resource Group on Science and Mathematics in 1991 to include the computer availability in 8th-grade math classes as an indicator for Goal 5, according to Senta Raizen, director of the National Center for Improving Science Education, and a member of the 1991 resource group. "Put yourself back almost a decade ago when computers were not as ubiquitous as now," she said. Only two types of schools had computers available – schools in affluent neighborhoods and schools that could purchase computers with Title 1 funds, she pointed out.

Raizen also noted at that time computers were housed in labs that were frequented primarily by boys. Bringing computers into the classroom would help expand their use to girls, she said.

"We also made the underlying assumption that having computers in the classroom of 8th-grade students is important because there are many things you can do with computers that you can not do simply with paper and pencil," Raizen explained. For example, students who have access to computers can engage in simulations, manipulate data from all over the world, and represent math functions in different ways. "All of these reasons are important components of reform efforts underway in math and science," said Raizen.

It is important to note that while computer literacy is widely accepted as a must for students and computers are present in most schools and classrooms, some educators argue that their potential to be integrated into the curriculum to advance student learning is as yet unmet. According to Dr. Pinky Nelson, direct of Project 2061, computers are not part of the math curriculum in most schools. "There is little evidence that teachers are relying on computers for instruction," he added. Nelson also cautioned educators and policymakers not to "advocate the mindless use of technology simply because it's cool."

This Monthly examines the efforts of the early 1990s in Tennessee, Alaska and Vermont to put computers in classrooms throughout each state. These states are the top three performing states in 1996 for having the highest percentage of computers available in 8th-grade math teachers' classrooms. However, it is clear that having computers available in math classrooms is only the first step

– and a tiny one – toward improving student learning in mathematics or any subject. The following are "Four Pillars" identified by the U.S. Department of Education's Office of Technology as essential elements for students to achieve to higher standards in math using technology.

The Four Pillars

Giving each child access to modern computers is the first of the four pillars of the nation's technology challenge, according to the Office of Educational Technology. The four pillars are:

- Every student will have access to modern computers and learning devices.
- All classrooms will be wired to one another and to the outside world.
- Educational software will be a central part of the curriculum.
- Teachers will be ready to use and teach with technology.

According to the Department of Education's Office of Educational Technology, "to make technology a viable instructional tool requires schools to have enough computers to provide full, easy access for all students, including students with disabilities." Links to relevant information about all the pillars of technology are available at the Office of Educational Technology web site at (**www.ed.gov/Technology**).

Classrooms connected to each other and to the outside world can "turn computers into versatile and powerful learning tools," according to the Office of Educational Technology. The web site points viewers to information on the e-rate program, and federal technology grants: Technology Innovation Challenge Grants and Technology Literacy Challenge Fund.

The third pillar – educational software – is one that is rapidly expanding. The Office of Educational Technology notes that "over 20,000 educational software titles have been developed, more than a million students take courses through distance learning networks every year and every day hundreds of new home pages are added to the Internet's World Wide Web."   How to select the most appropriate program and use it to improve student learning is the purpose of this pillar.

Only 20% of teachers reported feeling prepared to integrate technology into the classroom, according to a recent National Center for Education Statistics survey. Without this fourth pillar –

preparing teachers to teach with technology – computers will serve little purpose in the schools. Teachers need "access to technology and ongoing support while they learn," notes the Office of Educational Technology web site. "They need adequate time to acquire new skills to integrate technology into their schools' existing programs and activities." The web site points viewers to several related sites and programs, including ones on the Technology Literacy Challenge Fund, Star Schools Program and Technology Innovation Challenge Grants.

This Monthly goes back to the beginning – to the first pillar – to see how Tennessee, Alaska and Vermont moved to the top of the nation for putting computers in 8th-grade math classrooms. It also provides information on efforts under way in each state to build the remaining pillars of technology in the schools.

Tennessee

During 1996, the latest year for which data are available, 54 percent of public school 8th grade math teachers reported that they had computers available in their math classrooms, making Tennessee the nation's top performing state in this indicator. The national average for 1996 is 30 percent.

The early 1990s saw the emergence of a statewide effort in Tennessee to connect classrooms with the Internet. Beginning in 1991, through the Virtual School sponsored by Vanderbilt University and Oak Ridge National Laboratories, all teachers had the ability to connect to the Internet via a dial-up modem connection. The Tennessee Department of Education responded to requests for more access to technology by placing a computer in the library of all 1,560 public schools. By December 1994, 7,500 teachers had been trained and had access to e-mail accounts, according to the Tennessee Department of Education's web site.

In December 1994, transition to a network managed by the Tennessee Board of Regents was complete and training for scores of teachers, librarians and administrators continued through the Board of Regents, University of Tennessee, Vanderbilt University and Oak Ridge National Laboratory.

The state's new goal became to connect all of Tennessee's schools to the Internet with a full graphic connection. ConnecTEN, Connect Tennessee Students, was created as the vehicle to assist all schools with gaining access to the Internet with equipment that would allow a minimum of one computer per school. According to the Tennessee Department of Education, all schools in the state share access to a statewide network that links all 95 counties.

Information provided on the Tennessee Department of Education's web site also indicates the strong impact of the federal Technology Literacy Grant as a catalyst for a more sophisticated use of technology in the classroom. For example, the 1999 *Great Tennessee Internet "Learn Off,"* which relies on funds from the Technology Literacy Grant to reward teachers with approximately a $200 incentive for completing a professional development activity related to using technology to close an identified learning gap in student performance.

CONTACT:
        Tennessee Department of Education
        710 James Robertson Parkway
        Nashville, Tennessee 37243
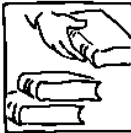   (615)741-2731   **www.k12.tn.us**

THE NATIONAL EDUCATION GOALS
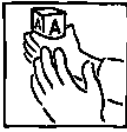
Goal 1: Ready to Learn

Goal 2: School Completion

Goal 3: Student Achievement and Citizenship

Goal 4: Teacher Education and Professional Development

Goal 5: Mathematics and Science

Goal 6: Adult Literacy and Lifelong Learning

Goal 7: Safe, Disciplined and Alochol- and Drug-free Schools

Goal 8: Parental Participation

Alaska

In Alaska, 50 percent of 8th-grade math teachers reported that in 1996 they had computers available in their math classrooms, compared to the national average of 30 per cent.

Local school budgets primarily financed computers in the classroom, according to Michelle DeShaw, program manager for technology and innovation, Alaska Department of Education. "Local districts made the decision to buy computers, using a combination of local and state funds," she said. DeShaw also pointed to school partnerships with business as another means of putting computers in classrooms during the early 1990s. For example, British Petroleum (BP) provided company computers and teacher training to schools. "Apple is another strong player in the market," noted DeShaw, who added that while most businesses do not always donate computers, the discounts are significant.

According to DeShaw, over 90% of classrooms are wired, with money coming from bonds, district funds and e-rate financing. Net Day efforts also are "extremely successful," she said. While Net Day offers thousands of volunteers to network schools, DeShaw highlighted the Alaska Science and Technology Foundation, which provides a one-time $10,000 grant to each school for wiring purposes. The grant began in the summer of 1996 and is ongoing.

CONTACT: Michelle DeShaw
Alaska Department of Education
801 West 10th Street
Suite 200
Juneau, Alaska 99801-1894
(907)465-4156
www.educ.state.ak.us

Vermont

Forty-four percent of Vermont's 8th-grade math teachers reported that in 1996 they had computers available in their math classrooms, placing Vermont third in the nation behind Tennessee and Alaska.

In the early 1990s, the math and science areas were the first to build computer labs because they were "quick connect areas with technology," said Phil Hyjek, information technology specialist with the Vermont Institute for Science, Math and Technology, a nonprofit organization. Similar to Alaska, a combination of local dollars and seed money or in-kind contributions from business – in this case IBM – launched the placement of computers in classrooms. Apple

Computers offered assistance with professional development, explained Hyjek, who during that time was a school superintendent.

Wealthy school districts with highly educated parents were another impetus for getting computers into schools, said Hyjek, who served as a school superintendent during the early 1990s. Parents who themselves were gaining computer literacy pressured schools to provide technology opportunities to their children. Three years ago, a state education reform law redistributed tax wealth by creating a "sharing pool," where lower-income school districts could get grants to speed up the development of their schools' technology programs, thus providing technology opportunities to rich and poor children alike.

Since then, "federal programs made the difference," said Hyjek. Like other state officials, Hyjek points to the Technology Literacy Challenge Grant (TLCF) as a primary source for wiring schools and training teachers. "If we were initially the innovators, TLCF has maintained us," he said.

CONTACT: Phil Hyjek
Information Technology Specialist
Vermont Institute for Science, Math and technology
Dillingham Hall
7 West Street
Montpelier, Vermont 05602
(802)828-0063
www.vismt.org

Federal Programs Advance Technology in the Schools

Several federal programs promote the rapid expansion of technology in the schools to improve student learning. State officials interviewed for this Monthly mentioned the Technology Innovation Challenge Grant and the Technology Literacy Challenge Fund.

The purpose of the **Technology Innovation Challenge Grant** is to provide funds to consortia that are working to improve and expand new applications of technology to strengthen school reform efforts, to boost student achievement and to provide sustained professional development for teachers, administrators and school library media personnel. These grants are not planning grants. They are five-year development and demonstration grants. In 1999, 22 new grants were awarded, ranging from about $500,000 to $2,000,000 a year.

In 1997, a five-year $2 billion **Technology Literacy Challenge Fund** breathed life into the four pillars of technology challenge. U.S. Education Secretary Richard Riley called on local, state, federal governments and the private sector to plan the Technology Literacy Challenge Fund. "The Technology Literacy Challenge Fund will help States, at whatever stage, to effectively increase the capacity of schools to integrate educational technology into daily teaching and learning," wrote Riley in a letter to each chief state school officer.

The Federal Communications Commission (FCC) is responsible for another federal program — the **E-Rate,** which is administered by the Schools and Libraries Division of the Universal Service Administrative Company. The E-Rate provides affordable access to advanced telecommunications services for all eligible schools and libraries in the United States. It is funded at up to $2.25 billion annually and provides discounts on telecommunications services, Internet access and internal connections.

A Business Perspective

Technology shared center stage with academic standards and assessment at the 1996 National Education Summit, convened by the nation's governors and business leaders. The Summit was designed to "jumpstart" a national effort to establish high academic standards, assessment and accountability and to improve the use of school technology as a tool to reach high standards, according to information on Achieve, Inc.'s web site (**www.achieve.org**)

"Educators must turn from the question 'Should schools have computers?' and address the issue of precisely how new technologies will be applied to improve American education, reads a press release issued in advance of the 1996 Summit. "Information technology is critical to improving the quality and diversity of education," said Wisconsin Governor Tommy Thompson at the Summit. "Technology is the great equalizer between school districts, making sure all our children have access to a high-quality education."

Milt Goldberg, executive vice president of the National Alliance of Business, underscored the importance of technology in the schools. "It's essential," said Goldberg, "because it not only is a tool to help exploit new possibilities about how people teach and learn, but it also has become such an essential part of our culture. For schools not to use it wisely and creatively is a disservice to students and teachers." However, Goldberg added that in order for the potential of technology to be met in the classrooms, "there

Upcoming Goals Panel Events and Products

January 20, 2000:   Release of *Promising Practices.*

February 26, 2000: NEGP meeting and announcement of NEGP chairman for 2000.

April 13, 2000: Teleconference – *Creating High Achieving Schools: Aligning Education Rhetoric, Resolve and Results* – A Goals Panel and National Alliance of Business discussion of applying Baldridge quality processes to schools.

needs to be much more intense and no-holds-bar conversation among educators, business leaders and the computer community to look at ways technology has been creatively used in enterprises outside of education."

Goldberg added that he would like to see more research done on examples of technology use in classrooms around the country to advance student learning.

The National Alliance of Business, along with several other business groups including The Business Roundtable and the U.S. Chamber of Commerce, recently issued a statement on key principles for reauthorizing the Elementary and Secondary Education Act (ESEA). One section of the statement is devoted to the need for federal education technology investments targeted to "encourage rigorous technology planning and assessment, and increase classroom access to a range of modern technologies that otherwise would not be possible." The business group, called the Business Coalition for Education Reform (BCER), specifically calls for ESEA "to allow states and local school districts to use federal grant funds in a flexible manner." From the statement: "States and local school districts should be helped to identify and utilize the best information available on software, electronic content, hardware and other technology resources."